Fisheries and Oceans Canada | Pêches et Océans Canada
Science | Sciences
Canadian Science Advisory Secretariat
Maritimes Region
Science Response 2014/018

MARITIMES RESEARCH VESSEL SURVEY TRENDS ON GEORGES BANK

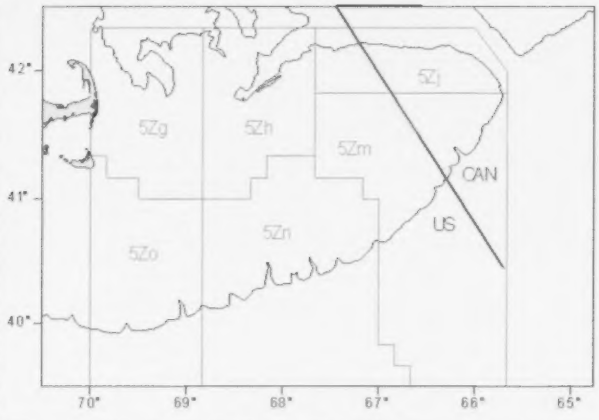

Figure 1: Northwest Atlantic Fisheries Organization (NAFO) Unit Areas

Context

DFO has conducted winter research vessel (RV) surveys in the Maritimes Region, Northwest Atlantic Fisheries Organization (NAFO) Area 5Z (Georges Bank; Figure 1) using a standardized protocol since 1987. Results from these surveys provide information on trends in abundance for groundfish species in the Maritimes Region. While these data reflect trends in biomass and abundance and are a critical part of science-based stock assessments, a full assessment, including other sources of data, would be required to evaluate the impacts of management measures on population status. Fisheries and Aquaculture Management (FAM) requested a review of the DFO winter survey information on the following species in 5Z1-5Z4 (Figure 2): Cod, Haddock, Pollock, Sea Raven, Ocean Pout, Yellowtail Flounder, Atlantic Wolffish, Monkfish, Smooth Skate, Thorny Skate, Barndoor Skate, Winter Skate, and Little Skate. The survey information will be used by FAM as background for discussions with various industry stakeholders on recommendations for management measures, and to determine which stocks should be reviewed in more detail in 2014.

This Science Response Report results from the Science Response Process of December 18, 2013, on the Review of Maritimes Research Vessel Survey Trends.

Background

The Georges Bank (5Z) winter RV survey has been conducted annually using a standard stratification since 1987. The survey follows a stratified random sampling design, and includes sampling of fish and invertebrates using a bottom otter trawl. These surveys are the primary data source for monitoring trends in species distribution, abundance, and biological condition on Georges Bank (for details see Stone and Gross, 2012).

The bottom trawl surveys were designed to provide abundance trends for fish and invertebrates between depths of about 30 m and 200 m. Survey indices are expected to be proportional to abundance for most species.

Strata boundaries are shown in Figure 2 for the 5Z area. Sampling was conducted in strata 5Z1 – 4, 5Z8 and 5Z9 in 2013. Catch distribution plots for the area sampled are provided for the suite of species requested. Biomass index trends are shown for 5Z1 – 5Z4. Comparisons of 2012 and 2013 length frequencies from the survey catch to the long-term mean (1987-2011) are also included for the selected stocks.

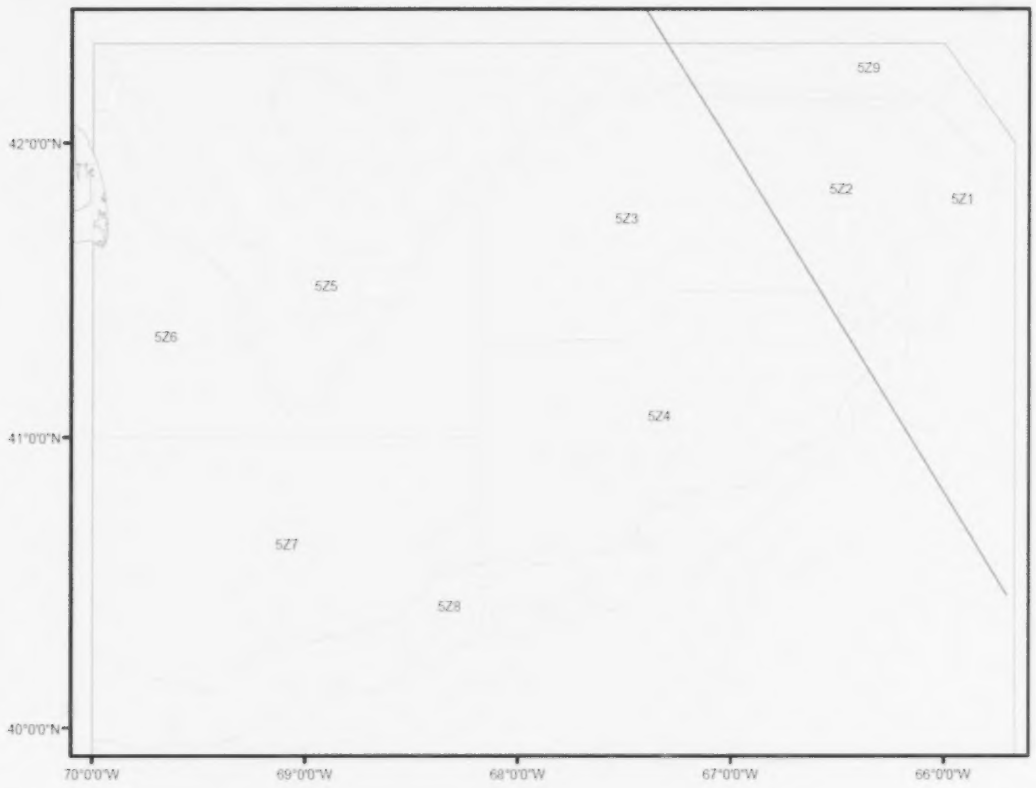

Figure 2. Georges Bank (5Z) winter RV survey strata.

Analysis

The time-series of survey biomass indices (not total biomass) are compared to averages for a series of time periods to provide historical context for biomass levels. The time periods used are a short-term 5 year average (2008 - 2012) and the long-term survey average (1987–2012). Information on calculation of these indices is contained in Stone and Gross (2012).

Atlantic Cod

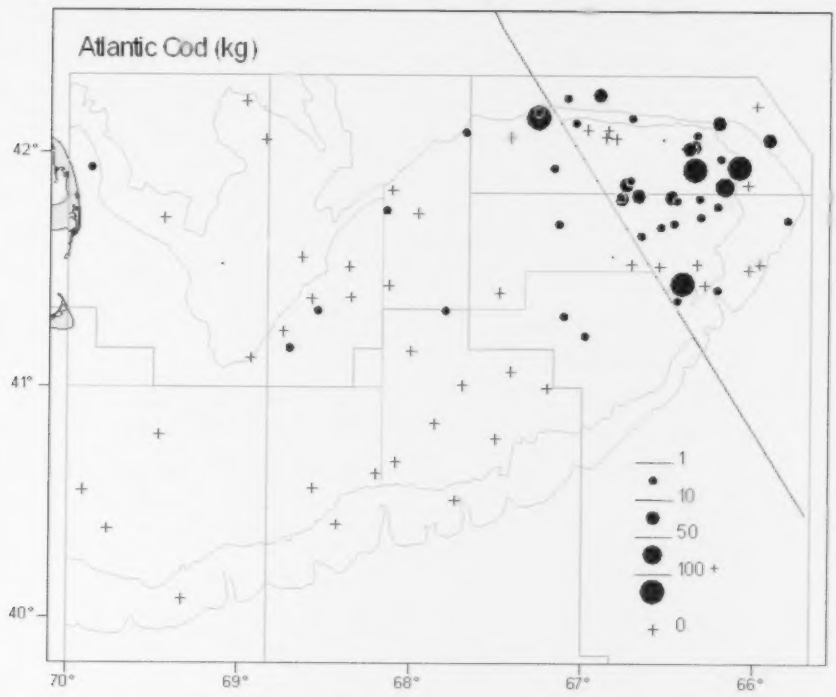

Figure 3a. Distribution of Atlantic Cod catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

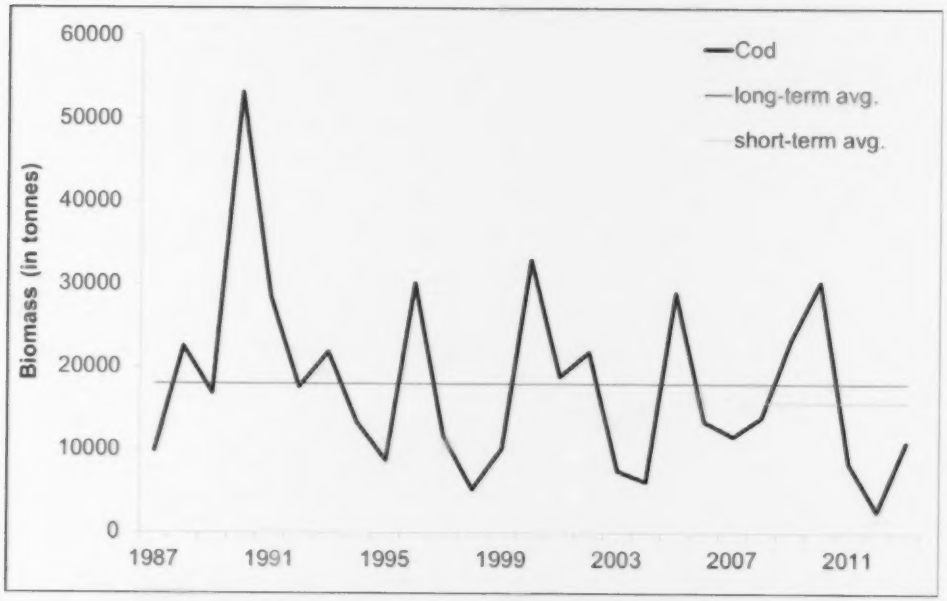

Figure 3b. Biomass index for Atlantic Cod in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

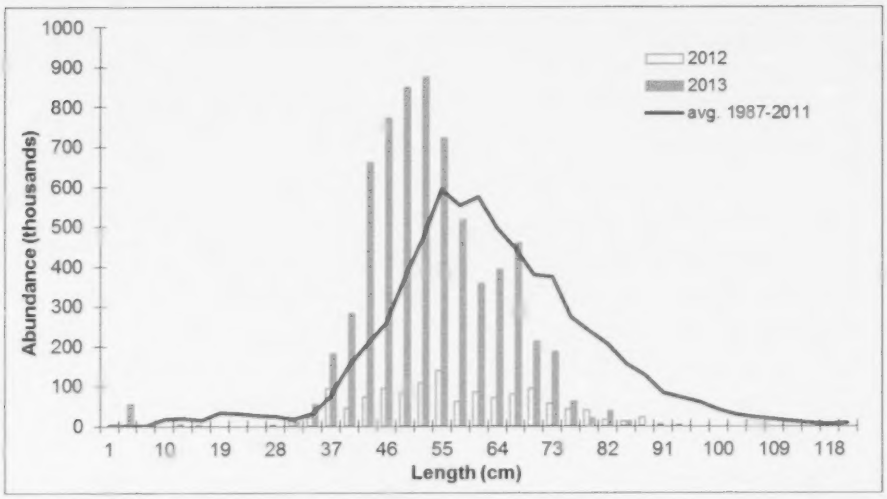

Figure 3c. Length frequency indices for Atlantic Cod in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Haddock

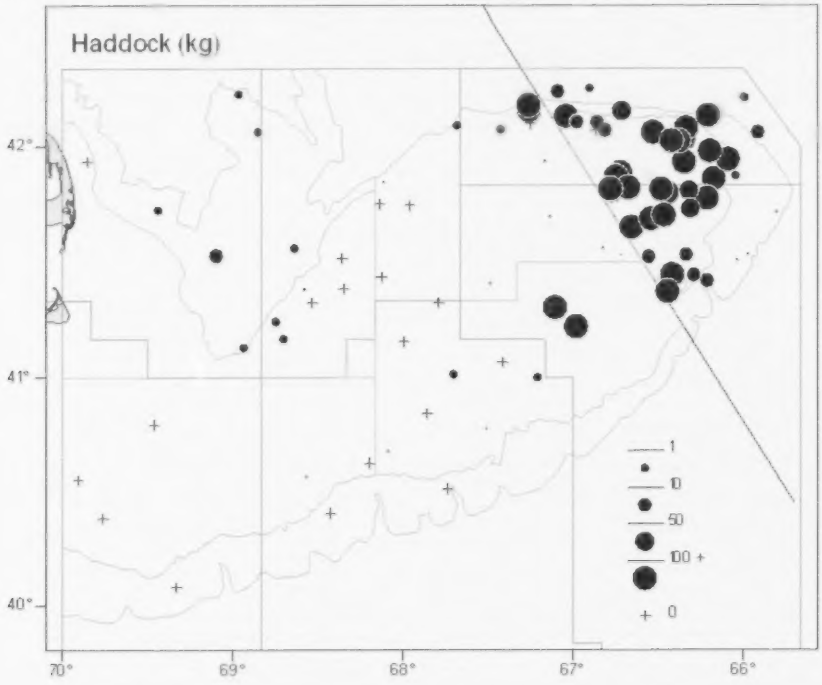

Figure 4a. Distribution of Haddock catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

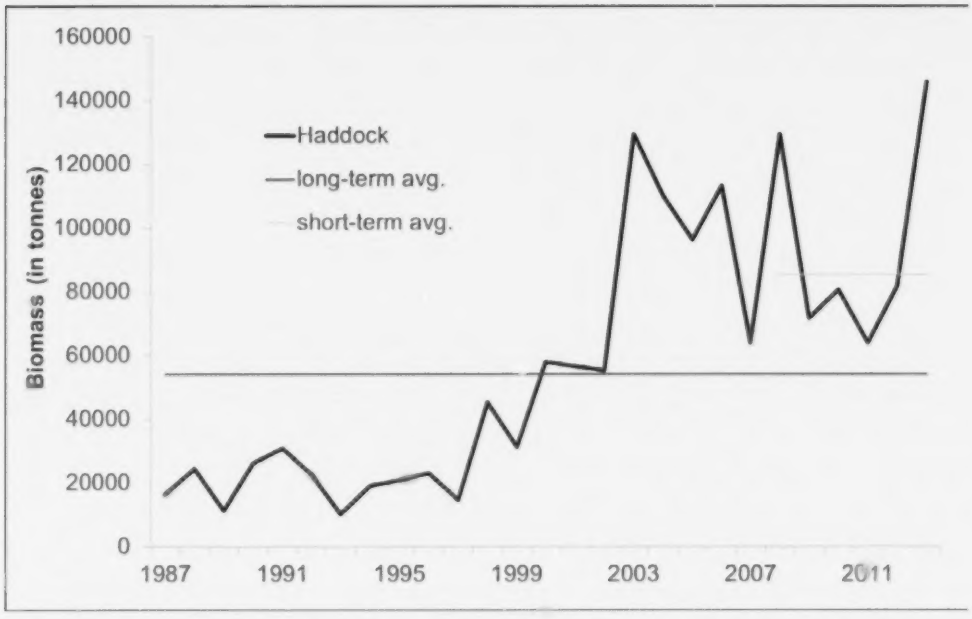

Figure 4b. Biomass index for Haddock in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

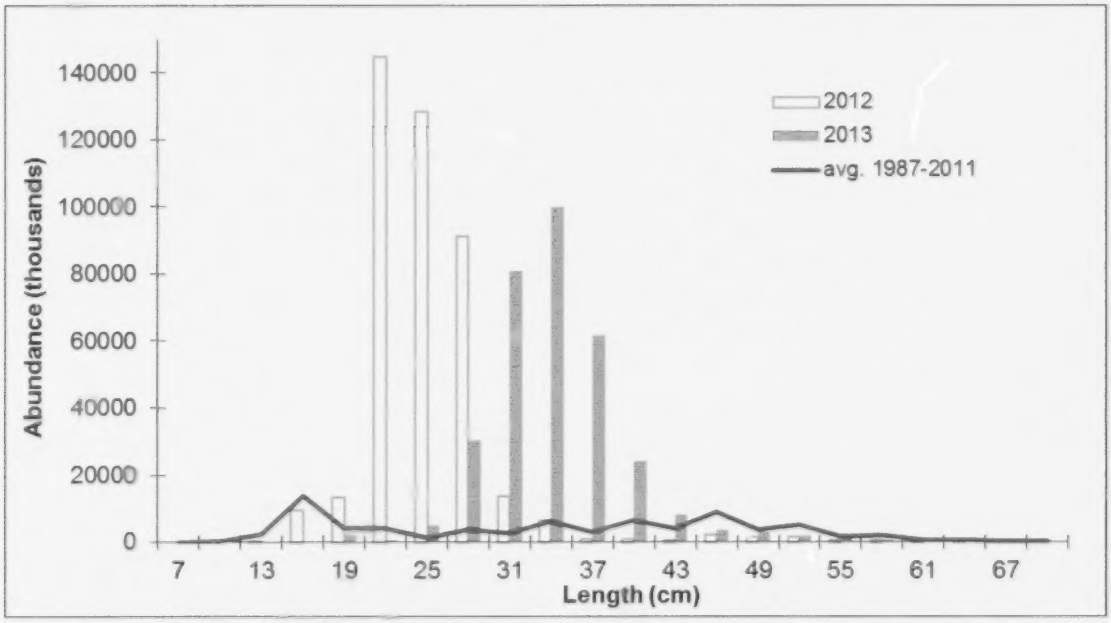

Figure 4c. Length frequency indices for Haddock in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Pollock

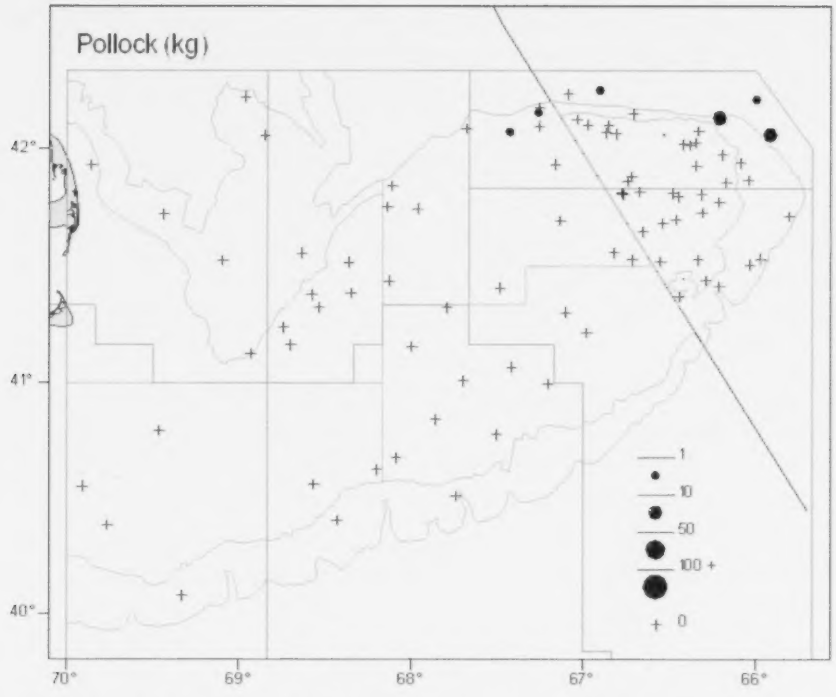

Figure 5a. Distribution of Pollock catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

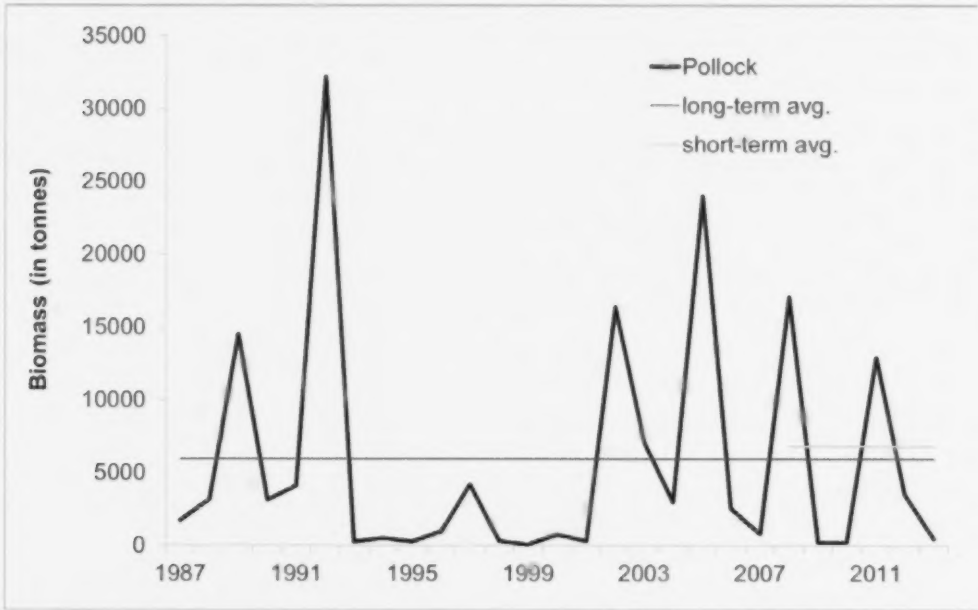

Figure 5b. Biomass index for Pollock in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

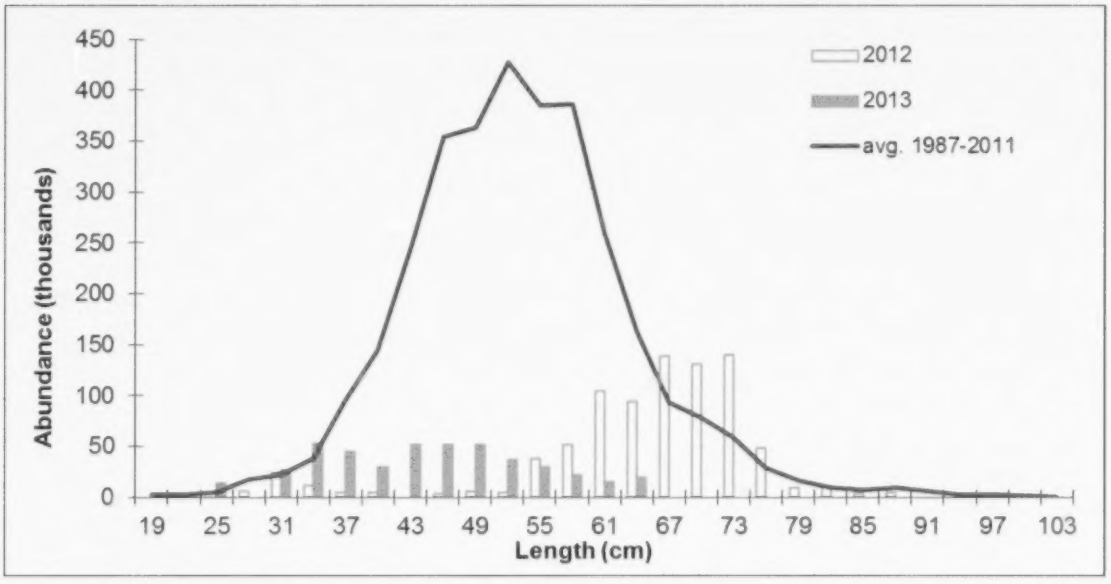

Figure 5c. Length frequency indices for Pollock in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

White Hake

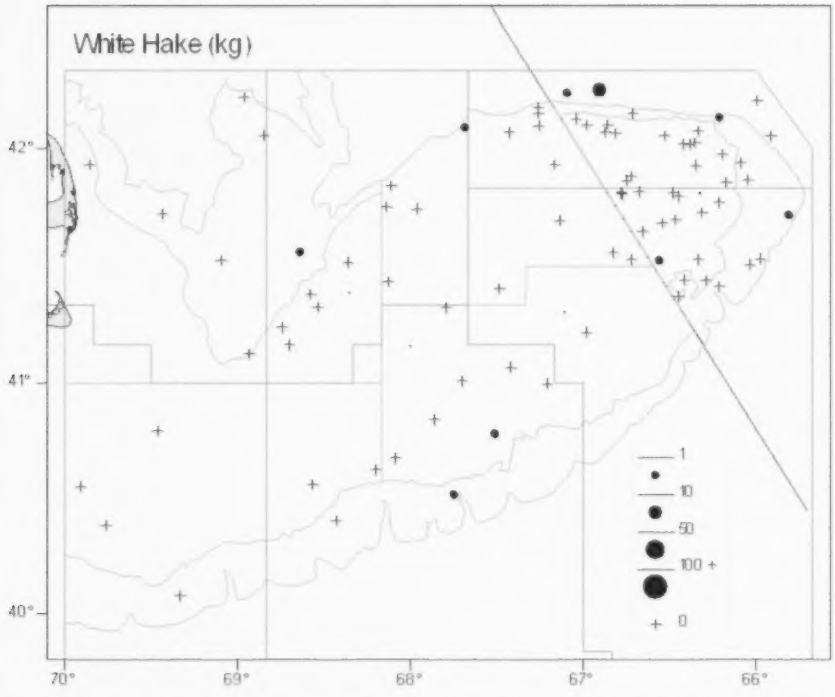

Figure 6a. Distribution of White Hake catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

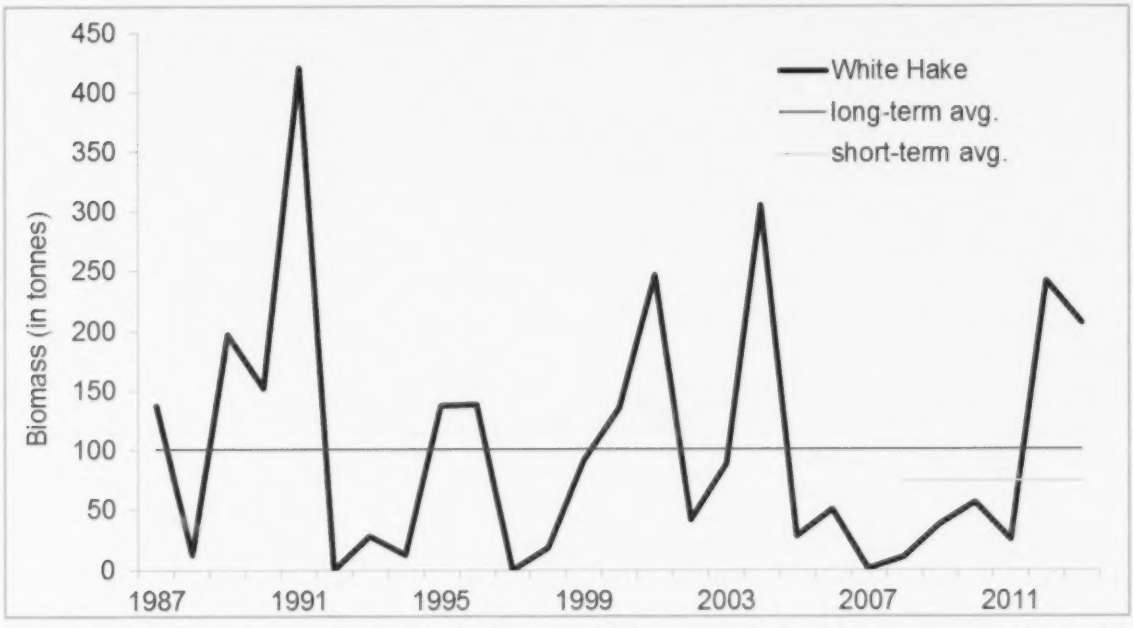

Figure 6b. Biomass index for White Hake in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

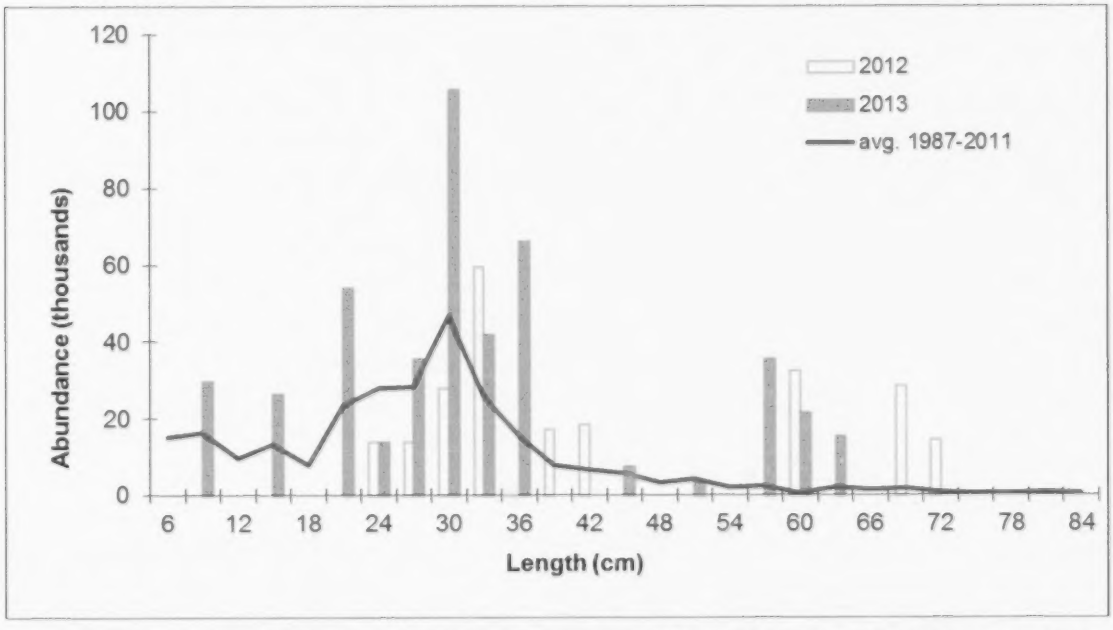

Figure 6c. Length frequency indices for White Hake in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Yellowtail Flounder

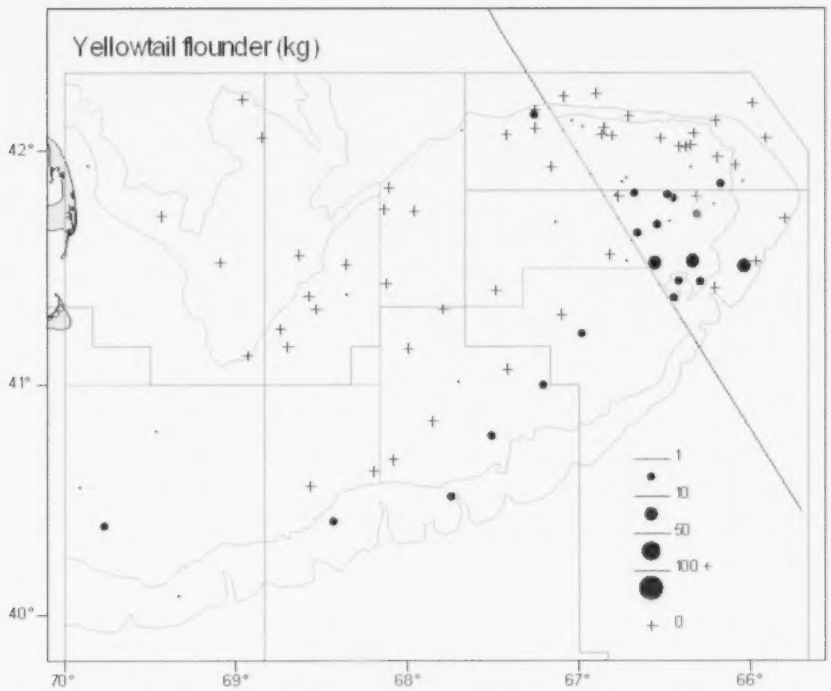

Figure 7a. Distribution of Yellowtail Flounder catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

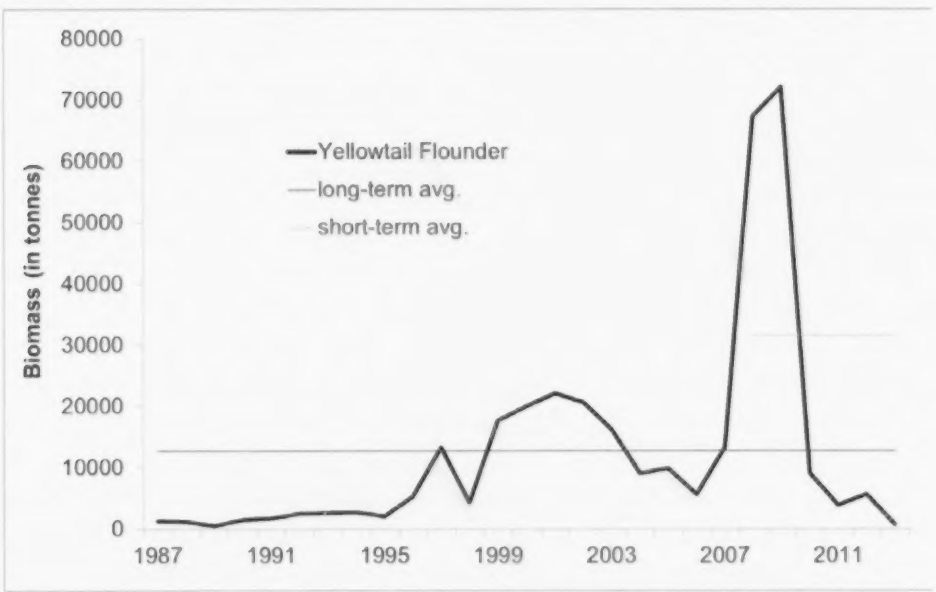

Figure 7b. Biomass index for Yellowtail Flounder in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

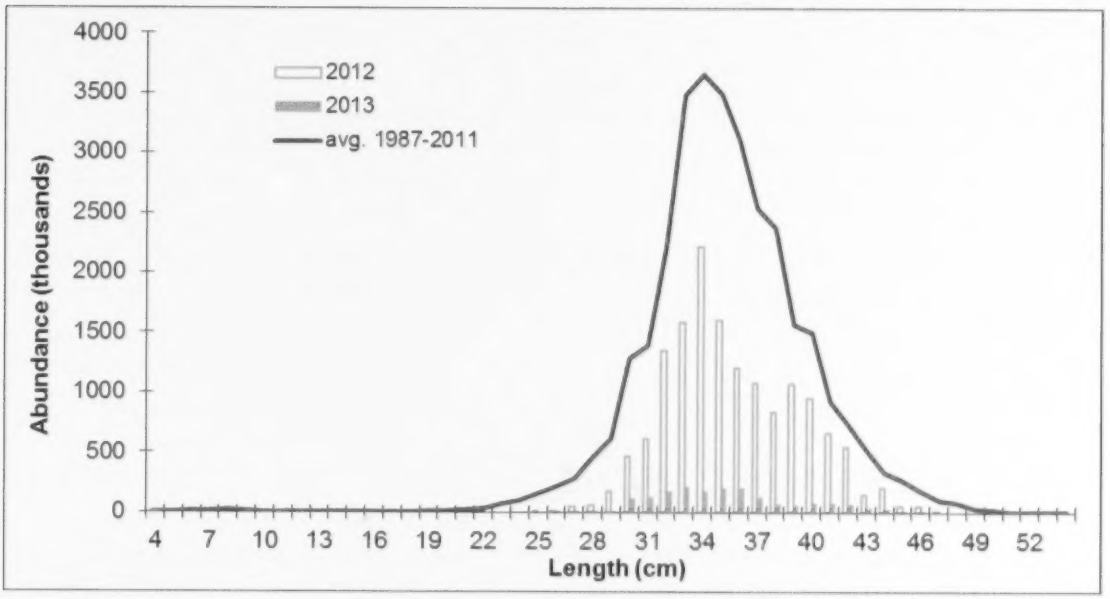

Figure 7c. Length frequency indices for Yellowtail Flounder in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Smooth Skate

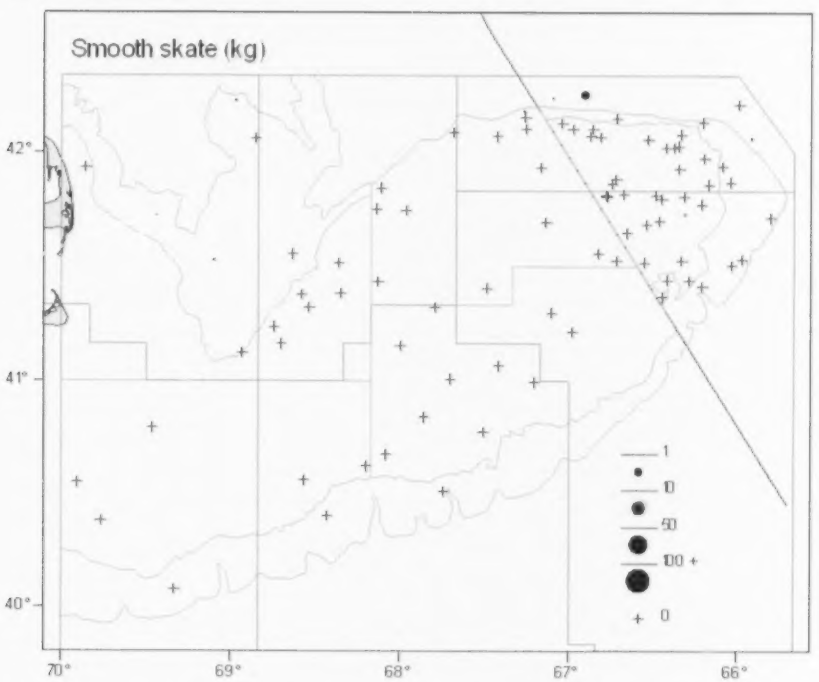

Figure 8a. Distribution of Smooth Skate catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

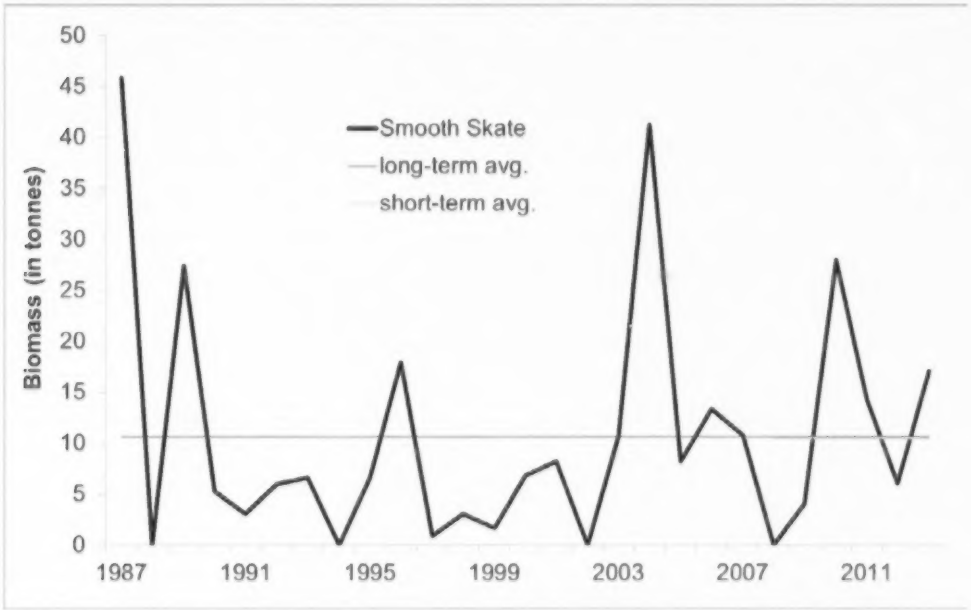

Figure 8b. Biomass index for Smooth Skate in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

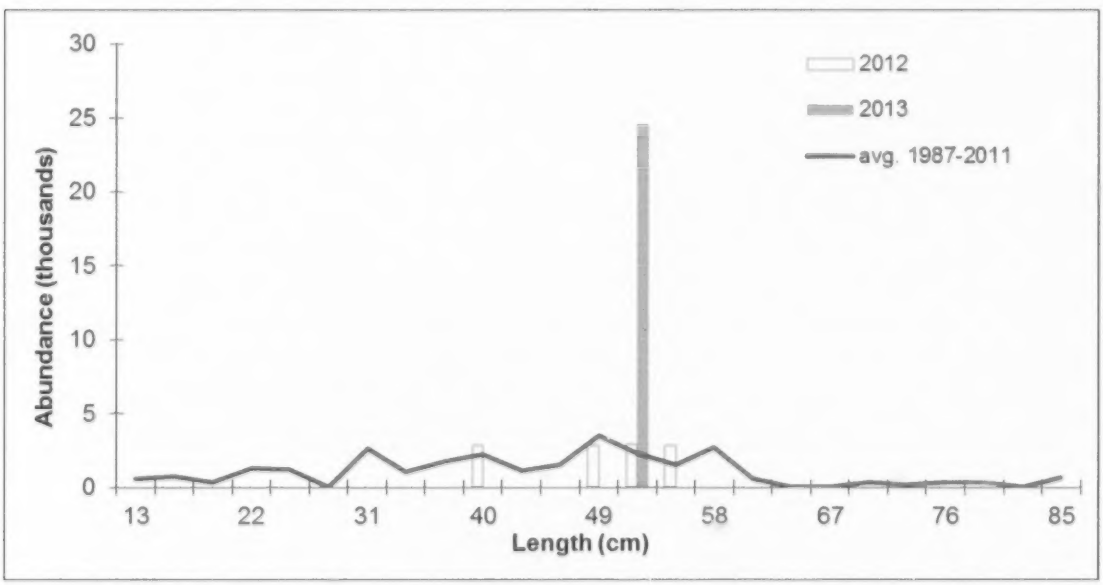

Figure 8c. Length frequency indices for Smooth Skate in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Thorny Skate

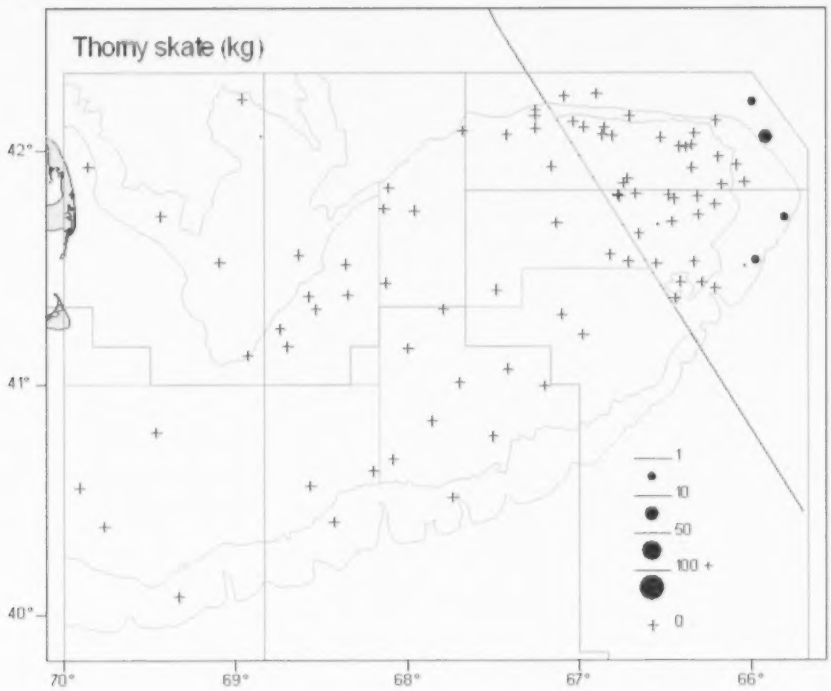

Figure 9a. Distribution of Thorny Skate catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

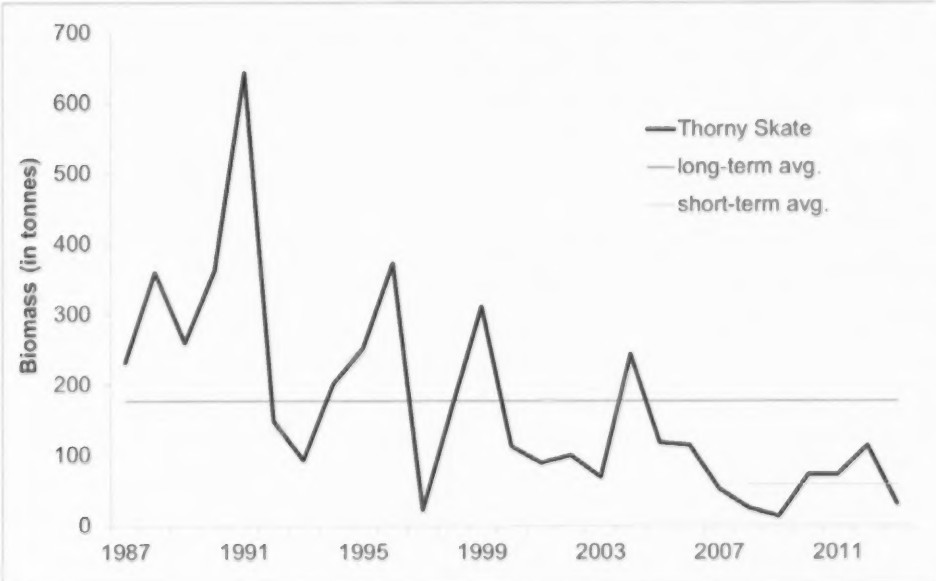

Figure 9b. Biomass index for Thorny Skate in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

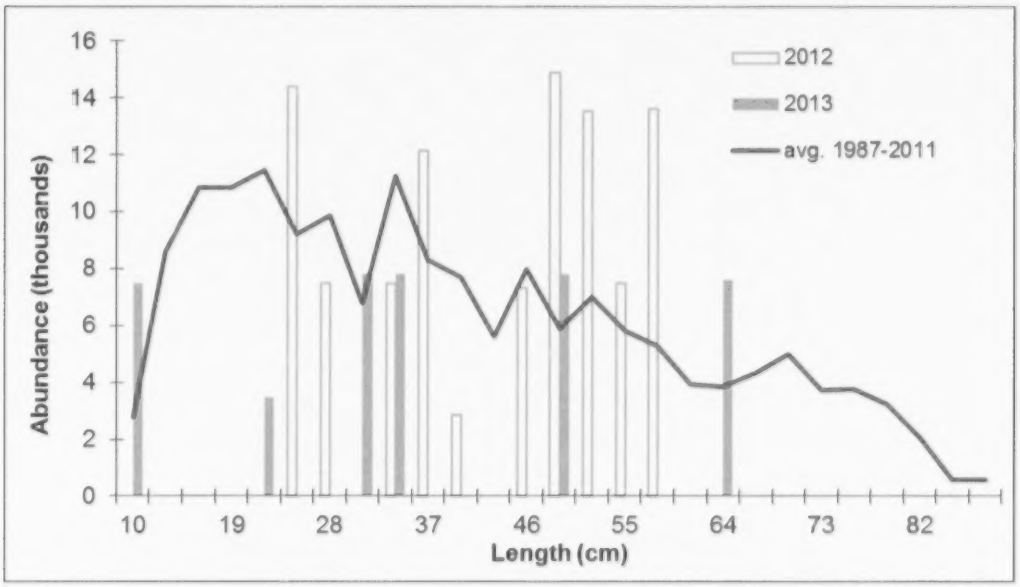

Figure 9c. Length frequency indices for Thorny Skate in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Barndoor Skate

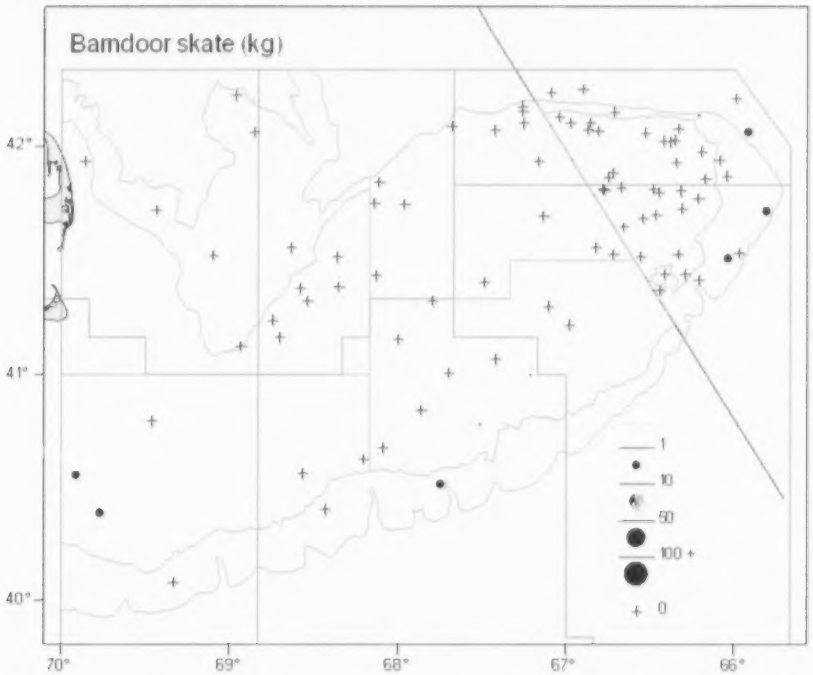

Figure 10a. Distribution of Barndoor Skate catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

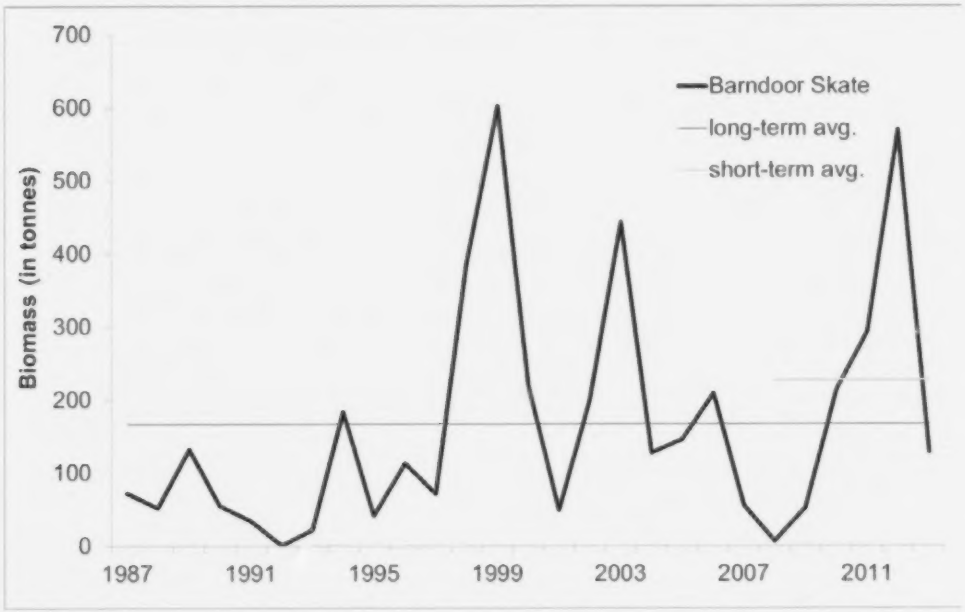

Figure 10b. Biomass index for Barndoor Skate in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

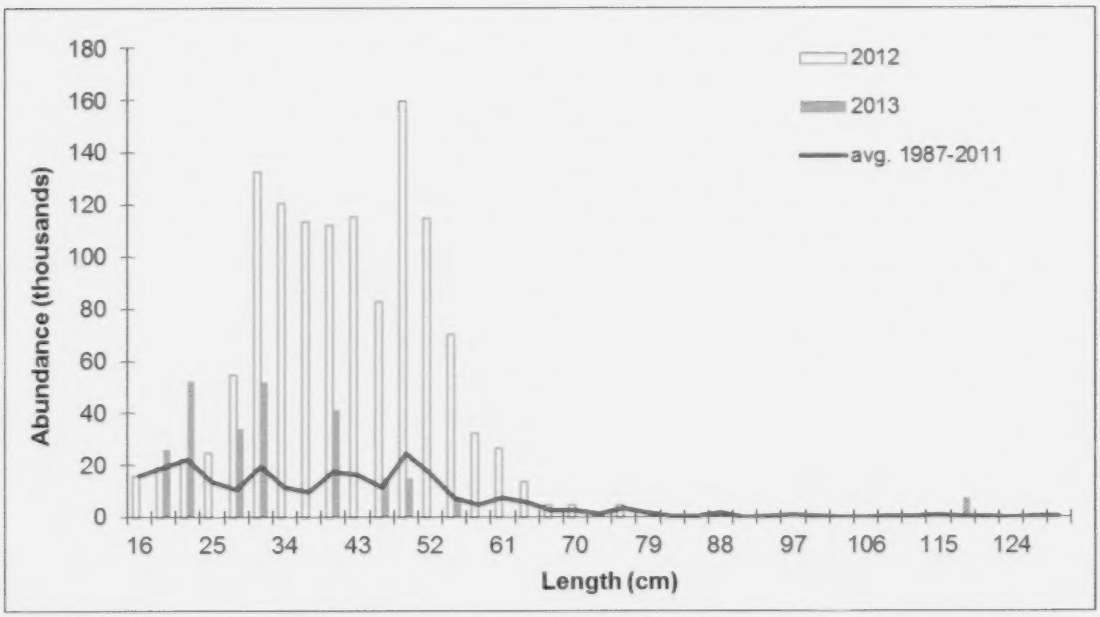

Figure 10c. Length frequency indices for Barndoor Skate in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Winter Skate

Winter Skate and Little Skate cannot be reliably distinguished at lengths less than about 40 cm. Given that the majority of the winter and little skates captured in the surveys are in this length range, the biomass trends are influenced by the contribution of fish for which identification is uncertain (for more information see McEachran and Musick, 1973).

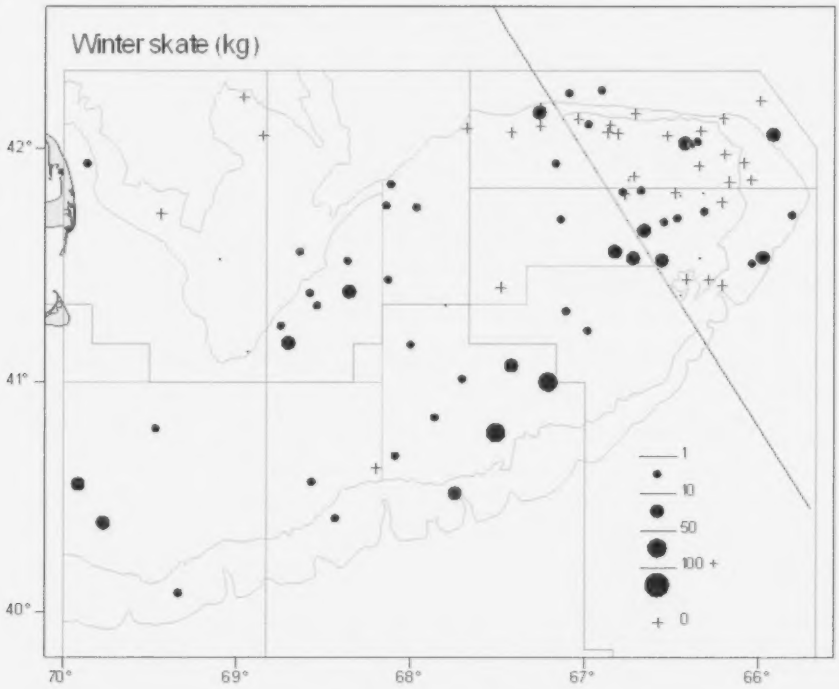

Figure 11a. Distribution of Winter Skate catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

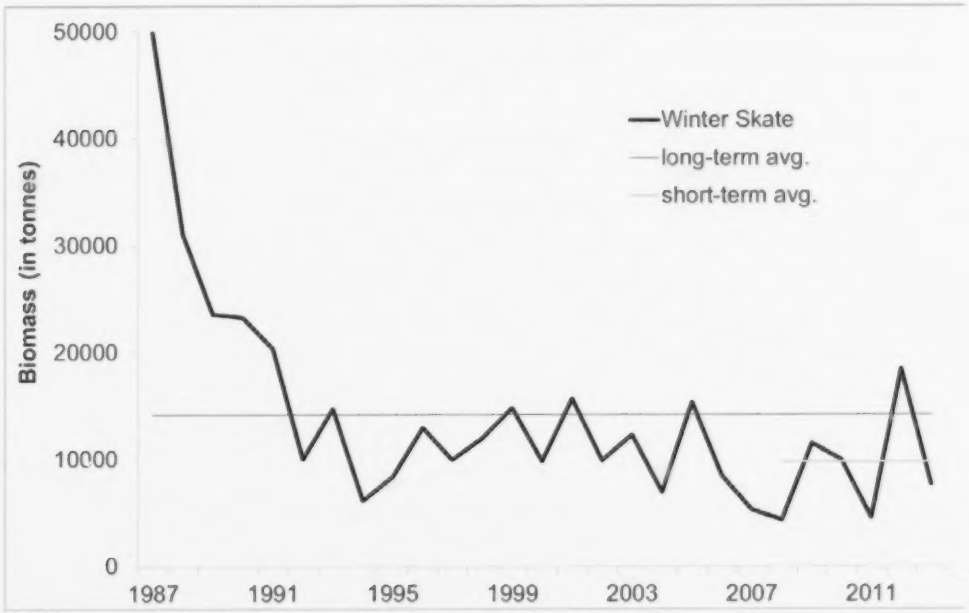

Figure 11b. Biomass index for Winter Skate in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

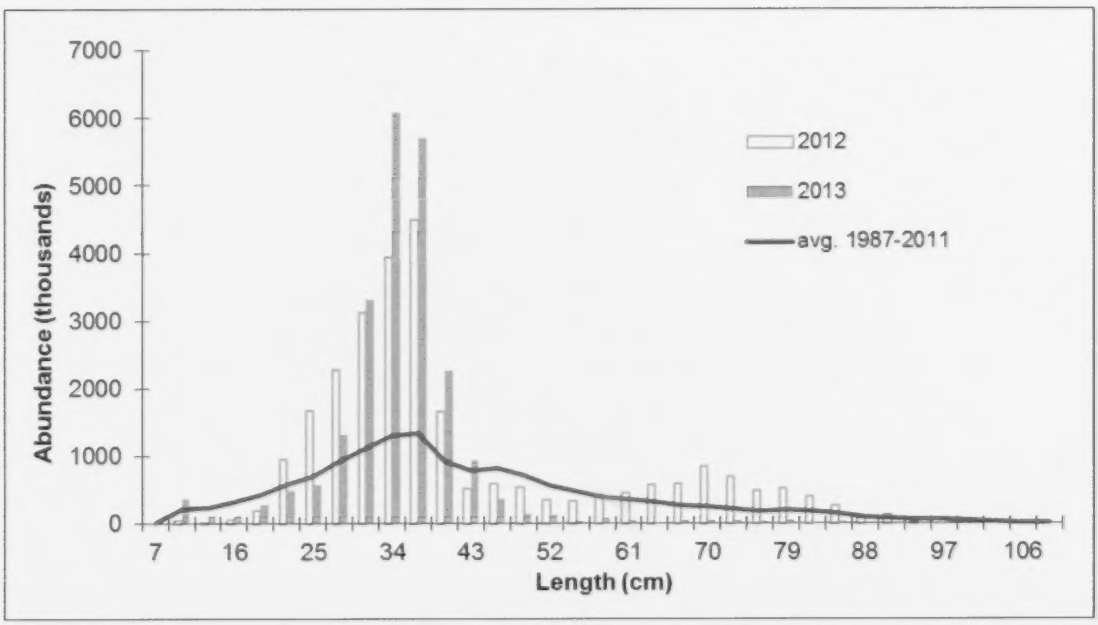

Figure 11c. Length frequency indices for Winter Skate in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Little Skate

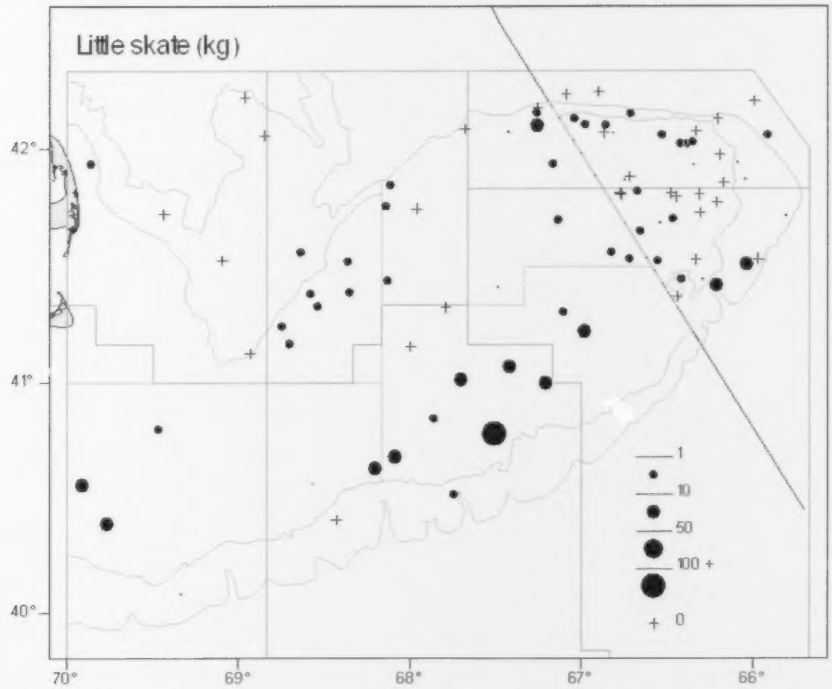

Figure 12a. Distribution of Little Skate catches during the 2013 winter RV survey. Zero catch is represented by the + symbol. Black circles represent catches. The circle area is proportional to the catch size.

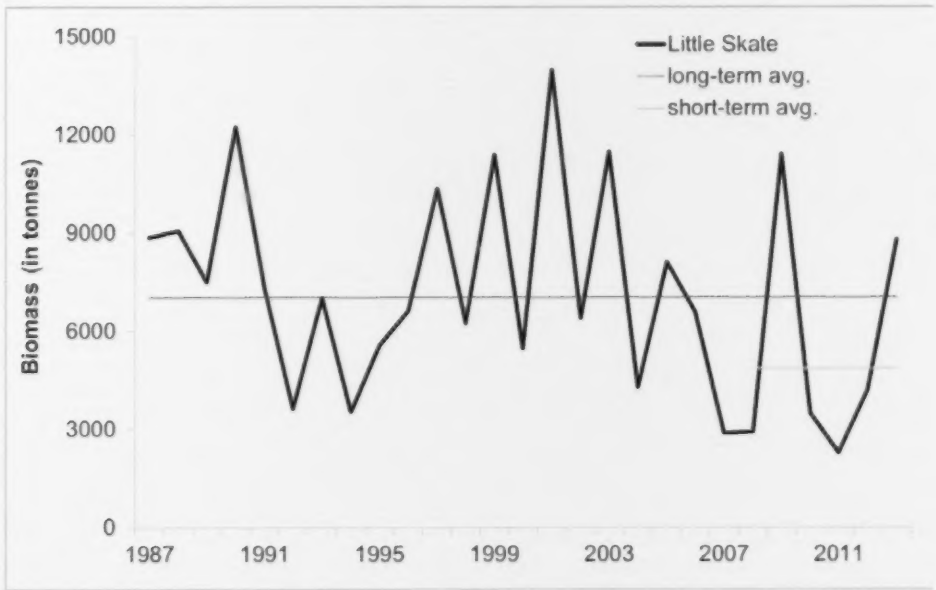

Figure 12b. Biomass index for Little Skate in strata 5Z1-5Z4 from the winter RV survey represented by the solid black line. The dark blue line represents the long-term survey average (1987-2012). The light blue line represents the short-term 5 year average (2008-2012).

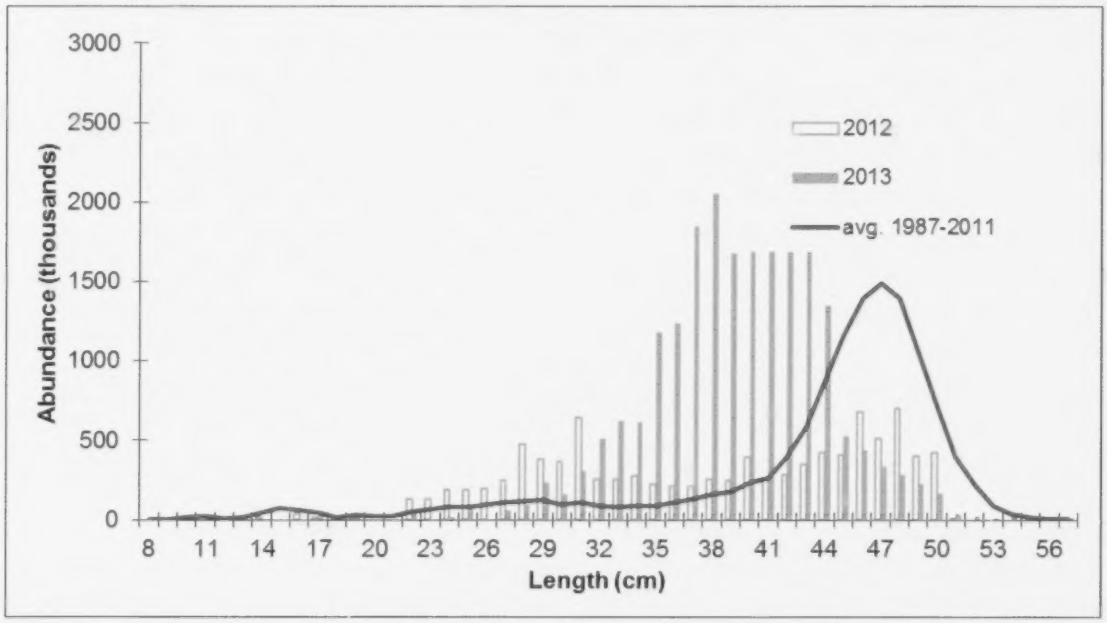

Figure 12c. Length frequency indices for Little Skate in strata 5Z1-5Z4 from the winter RV survey. The solid red bars represent the number in thousands at length from the 2013 survey. The open green bars represent the number in thousands at length from the 2012 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2011.

Conclusions

Biomass indices from the winter RV survey were compared with short-term (2008-2012) and long-term averages (1987-2012). Length frequencies for 2012 and 2013 were compared to long-term averages (1987-2011).

Contributors

Donald Clark	DFO Science, Maritimes
Tara McIntyre	DFO Science, Maritimes
Jamie Emberley	DFO Science, Maritimes
Verna Docherty	DFO Fisheries and Aquaculture Management
Christie Whelan	DFO Science, Maritimes
Lottie Bennett	DFO Science, Maritimes
Heath Stone	DFO Science, Maritimes
Kirsten Clark	DFO Science, Maritimes

Approved by

Alain Vézina
Regional Director of Science, DFO Maritimes Region
Dartmouth, Nova Scotia
Tel.: 902 426-3490

Date: December 20, 2014

Sources of information

McEachran, J.D., and Musick, J.A. 1973. Characters for Distinguishing Between Immature Specimens of the Sibling Species, *Raja erinacea* and *Raja ocellata* (Pisces: Rajidae). Copeia 1973: 238-250.

Stone, H.H., and Gross, W.E. 2012. Review of the Georges Bank Research Vessel Survey Program, 1987-2011. Can. Manuscr. Rep. Fish. Aquat. Sci. 2988.

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Center for Science Advice (CSA)
Maritimes Region
Fisheries and Oceans Canada
PO Box 1006, Station B203
Dartmouth, Nova Scotia
Canada B2Y 4A2

Telephone: 902 426-7070
Fax: 902 426-5435
E-Mail: XMARMRAP@mar.dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

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